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INTERPRETOSCOPE

The interpretation of information derived from photographs is today an indispensable aid in the solution of technical, economic, and scientific problems.

Particularly high demands are placed on the readability of photographs, especially of those of the sort usually taken from aircraft. To keep pace with the continual improvement in photographic materials and the employment of cameras fitted with high-performance objectives, there is required an apparatus which offers the possibility of studying in the laboratory the consistent spatial relationships contained in aerial photographs and thereby holding the fieldwork to a minimum. In the Interpretoscope the ST present to the profession a modern interpretation device, distinguished by its high level of performance, simplicity of operation, and sturdiness and rationality of construction. It satisfies all the demands, and even the wishes, placed on apparatus of this type.

AREAS OF APPLICATION

An aerial photograph presents to the viewer a survey of every visible detail in the photographed area at some instant in time. The field of application of the instrument lies, therefore, in those disciplines concerned with the changes, the description, or the study of the surface of the earth. By special interpretation of the picture content, which can be done exactly only under stereoscopic viewing, it is possible to extract quantitatively the total information content of the picture. Exact interpretation work is also a prime requirement for the quantitative ^{plotting} ~~evaluation~~ of aerial photographs, although in the preparation of topographic maps, for example, one must carry through an extensive generalization of the detail in order to insure legibility.

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In this way task-oriented photointerpretation renders valuable services in forestry, geology, geography, ~~the planning of~~ agri-culture, ~~settlements~~ commerce, and city and regional planning, as well as for military intelligence.

Besides interpretation tasks, the equipment also serves for picture scanning and for preparatory work on pictures which are to be plotted in cartographic operations. Picture scanning may include judging the photographic quality, checking the overlap of adjacent pictures, the flight path, and the recognition of marked points on the ground. The preparation of pictures for stereoscopic evaluation implies the selection of the evaluation technique to suit the character of the terrain or the choice of points to be used in net-orientation or triangulation.

MODES OF OPERATION

The picture material to be interpreted can be on positive or negative material, in rolls or individual pictures, on film, glass plates, or paper. There are no restrictions on the choice of emulsion. Thus, the material best suited to the task at hand may be used, such as panchromatic, infrared, or color.

The range of motion of the objectives and the optical rotation of the picture are so chosen that stereoscopic viewing of near-vertical aerial photographs is possible without displacing the pictures. The following table gives information on the range of application to standard photographic formats.

SIZE, CM.	OVERLAP		COMMON AREA	
	CHIP PAIRS	ROLL PAIRS	CHIP PAIR	ROLL PAIR
18x18 (7") (18x18)	no limit	50%+	inner	or outer
23x23 (9") (23x23)	"	40%+	"	" "
30x30 (12")	35-75%	35-75%	inner	inner

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The viewing magnification may be varied between 2x and 15x. Thus, the interpreter has a broad range of choice in selecting the most favorable magnification. Magnification of greater than 15x generally yields, because of the grain of the emulsion, no improvement in interpretability. The 2x-15x range of magnification is divided into ~~two ranges~~ ^{two ranges} stages. Within these stages, the change in magnification is by means of a stepless zoom system. The first stage extends from 2x to 6x while the second extends from 5x to 15x. The change from one stage to the other is accomplished by means of a rapid change of a turret-objective. No eyepiece change is required, though, so that the interpreter retains a nearly distortion-free stereoscopic view of the picture throughout the entire 2x to 15x range.

If the scale of the individual pictures of the pair is different, the zoom system will compensate in magnification up to a ratio of 1 : 3, or by using the turret-objectives as well, up to 1 : 7.5.

CONSTRUCTION

The Interpretoscope consists of the basic units:

Viewing unit for stereoscopic viewing

Light-table for supporting the picture material

which are connected to continuous side-members. The distance between the table and the viewing optics has been chosen large so that the operator has easy access to the pictures.

In the viewing unit the objectives and rotation prisms move on cross-slides in the x- and y-directions under the control of hand-grips. The distance between the two objectives, to which the two pictures are aligned, is controlled by rotating a spindle which is brought out to the left hand-grip. When changing to a different picture format, the objectives can be approximately positioned out to 220 mm (8 $\frac{1}{2}$ "), so that they are adjustable to a maximum distance of 310 mm (12") and a minimum distance of 90 mm (3 $\frac{1}{2}$ ") apart.

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OPTICS

The pictures on the light table are viewed frontally. Focusable objectives pick up the picture and image it via rotation prisms and Schmidt prisms which are individually adjustable for the right and left picture onto the intermediate image plane. The intermediate images are ~~viewed~~ imaged through prisms and a zoom optical system which allows for stepless change in magnification onto the ocular plane. There the image is viewed through a double ocular. In the ocular plane is located a black, point reference mark. The operation of the image rotation and the zoom systems is carried out by means of knobs on the front plate of the viewing unit.

The optical system is notable for its especially large stereoscopic field of view and its high image quality. The size of the field of view in the picture plane is given by $200/m$ mm, where m is the magnification. Thus, at 2x the field measures 100 mm ($4''$) and at 15x, 13 mm ($\frac{1}{2}''$). The operator thus has the opportunity to get an overall view of the picture at 2x and then, by using a higher magnification, to interpret in detail.

The resolution capability, referred to the picture plane, depends upon the magnification as the following table indicates;

MAGNIFICATION	RESOLUTION, l/mm
2x	13
6x	40
13x	100

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LIGHT TABLE

The light table carries a glass plate 30cm x 30 cm (12x12") to support the picture material. Hold-down strips along the sides of the plate serve to hold roll-film of any format. Moveable and rotateable table-clamps hold individual pieces of film. Cover-glass plates serve to hold strongly curved material ~~flat~~ flat.

HOLDING DEVICE FOR ROLL-FILM

On the side-members of the apparatus are removable holders for roll-film up to 32mm (1 1/2") wide. The tapered end of the leader is inserted into a longitudinal slit in the take-up drum and wound up by turning a drive-wheel.

ILLUMINATION

The apparatus is equipped for both transmitted- and incident-light viewing. Fluorescent lamps are installed under the glass plate to provide even illumination for transparent picture materials. Incident-light illumination is provided by projector lamps and condensers. These move along with the objectives and thus always illuminate the portion of the picture being viewed.

In order to regulate the brightness, fluid filters are inserted into the light path. They permit the brightness of either picture to be regulated individually in both transmitted and incident light. The control knobs are on the front panel of the viewer unit.

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MEASUREMENT OF HORIZONTAL PARALLAX DIFFERENCES

If the flight altitude and the distance between taking points is known and the difference in horizontal parallax is measured, the relative object heights of neighboring points may be calculated.

For this reason, relative motion between the two objectives is provided for, as well as the free motion in the x- and y-directions.

The base-line of each picture is oriented along the x-axis of the instrument by rotation of the picture in the picture-plane, while the y-motion is clamped.

The parallax setting obtained by turning the left hand-grip while observing the reference mark is read out on a micrometer scale to the nearest 0.02mm. The parallax difference is taken as the difference between two conjugate readings. The parallax in the y-direction is eliminated by turning the right hand-grip.

ACCESSORIES

In order to measure distances on the photograph, a glass scale ~~is provided~~ 200mm (5") long is provided, whose smallest division on the first 10mm measures 0.1mm. The scale is placed on the photograph and examined through the Interpretoscope. Besides the take-up drums for roll-film, film spools may also be fitted into the holders. Adapters are furnished for 20 and 24 cm spools. The adapter together with the spool replaces the drum. Spools for 32-cm film may be inserted directly.

For flattening strongly curved material, 30x30 cm glass plates are provided.

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DATA

Magnification: 2x-6x and 5x-15x

Magnification compensation between right and left picture:

with zoom: up to 1 : 3

with zoom and turret: up to 1 : 7.5

Field of stereoscopic view: 200mm/magnification

Diopter adjustment: ± 5

IPD Adjustment: 55--75 mm

Illuminated surface: Incident light - adjustable to 110 mm ($4\frac{1}{2}$ ") dia

Transmitted light - 600 x 300 mm (24×12 ")

Optical image rotation: 360 deg

Common displacement of objectives: (Free-hand motion) x-axis max 240 mm ($9\frac{1}{2}$ ")

y-axis max 300 mm (12")

Parallel-axis motion of objectives: x-axis 90 - 310 mm ($3\frac{1}{2}$ - 12")

y-axis ± 65 mm ($2\frac{1}{2}$ ")

Operating voltage: 220V 50 cy

Power requirement: 250W

Dimensions: Width without film-holder: 1000 mm ($39\frac{1}{2}$ ")

Width with film-holder: 1260 mm (50")

Depth: 700 mm ($27\frac{1}{2}$ ")

Height: ($50\frac{1}{2}$ ")

Weight: ~~620~~ 276 kg (620 lb)

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ORDER LISTInterpretoscope

Apparatus for interpretation of aerial photographs. Stereoscopic picture viewing with continuous change of magnification from 2x to 6x and from 5x to 15x. Viewing of cut and uncut material up to 30 x 30 cm (12x12") format with 75% overlap possible in both incident and transmitted light.

Shipment includes:NomenclatureOrder number

Interpretoscope for 190 mm, 200 mm, 240 mm and 320 mm film widths

14-0-040

comprising:

1 each <u>Support with picture stage</u> with	145108:001.14
1 ea. Ground glass plate	145108:051.00
7ea. Fluorescent lamps 20/59	TGL 8624
1ea. Blower	582405:017.14
7 ea. Starter, St 3 for lamps	TGL 70-43
2 ea. Switches, 2-pole	055290:031.28
7 ea. Switches E 20	TGL 4229
1 ea Power cord	145108:065.10
8 ea Table clamps for single pictures	145108:002.11
1 ea <u>Viewing Unit</u> with	
2 ea. Fluid light-filters	583566B
1 ea. Transformer	058011:002.53
2 ea. Projector lamps T F1/6V 30W	TGL 10619
1 ea. Glass measuring scale 200mm	147520
1 ea. Case for glass measuring scale	149705
Carbon brushes for incident-light illuminator	145108:217.10

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<u>NOMENCLATURE</u>	<u>ORDER NUMBER</u>
2 pr Adaptors for film spool 19-20/120	147350:037.11
2 ea Holder for roll-film to 32 cm width	145108:002.14
2 ea Drums, take-up for roll-film to 32 cm	145108:082.10
2 ea Cover-glass plates 30 x 30 cm	145108:101.00
2 ea Hold-down strips for roll-film	145108:001.11
1 ea Stool, black	042401 B
1 ea Dust-cover	029510:079.24
1 ea Packing-case	029522:571.24

On Special Order

2 ea Film spools 19-20/120	142650:002.24
2 ea Film spools 24/120	142651 A
2 pr Adaptors for film spool 24/120	147350 U38
2 ea Film spools 32/120	142652 A

MANUAL

1 ea Instructions	14-G352-1
1 ea Plan and wiring diagram	